



ABSTRACT AND BIOGRAPHY

NASA OCE Study on Flight Software Complexity

The expanding role of flight software in NASA's spacecraft has led to flight systems under development now that easily exceed a million lines of code. In 2007 the NASA Office of Chief Engineer (OCE) commissioned a multi-center study to bring forth technical and managerial strategies to address risks from growth in size and complexity of flight software. The motivation for the study grew from problems attributed to flight software in a variety of missions—in both pre-launch and post-launch activities—and concerns that such problems were growing. The study was tasked to examine the growth in flight software size and complexity, recommend ways to reduce and better manage complexity, and identify methods of testing complex logic. Part of the study focused especially on fault protection software because of its complexity. Study participants consisted of engineers and managers at Applied Physics Laboratory, Goddard Space Flight Center, Jet Propulsion Laboratory, Johnson Space Center, and Marshall Space Flight Center. This talk examines the growth in flight software, sources of increased complexity, and main findings and recommendations.

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Dan Dvorak is a principal engineer in the Systems and Software Division at JPL, with one foot in systems engineering and the other in software engineering. Much of his work has been about bridging the gap between the two disciplines through a common architecture that shapes both the systems analysis process and software design. Dan is currently PI for a R&D task to develop human-rated automation and control technology to ensure that robotic systems can work safely with astronauts.

Prior to joining JPL in 1996, Dan worked at AT&T Bell Laboratories on a number of projects including a rule-based extension to C++ and a system for monitoring the nation's 4ESS electronic switching systems for long-distance telephone traffic. Dan holds a Ph.D. in computer science from The University of Texas at Austin, an MS in computer engineering from Stanford University, and a BS in electrical engineering from Rose-Hulman Institute of Technology. Dan's interests include software architecture, autonomy and robotics, fault protection, and system software verification.